Reclamation Plan
Marys River Exploration Project Area
Elko County, Nevada
2013

Report Prepared for:

Bureau of Land Management
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Noble Energy Inc. (Noble Energy) will be implementing an exploration project in the Marys River Project Area near Wells, Elko County, Nevada. This general reclamation plan is designed to meet the standards set by the Bureau of Land Management (BLM) and in accordance with State of Nevada Division of Environmental Protection laws and regulations. Site specific reclamation plans will be completed at the time the site specific use plan is submitted.

1.0 Project Area Description

The Marys River Exploration Project Area includes Sections 1, 2, 11–14, and 23–26 T38N:R60E; Sections 2–11, 14–23, and 26–35 T38N:R61E; Sections 23–26, 35, and 36 T39N:R60E; and Sections 19–23 and 26–35 T39N:R61E. The southeastern corner of the Project Area is approximately four miles northwest of Wells, Nevada. The Project Area includes approximately 39,366 acres that includes 52% federal (BLM) and 48% private lands. The Humboldt River and Bishop Creek bisect the Project Area. Elevation within the Project Area ranges from 5,300 to 5,700 feet above sea level. Topography is relatively flat with rolling hills, many drainages, hilltops, draws, and eroded hillsides.

1.1 Vegetation

Vegetation is primarily comprised of Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) stands with numerous areas dominated with rabbitbrush (*Chrysothamnus* spp.) and dead sagebrush. Areas of big basin sage (*A. tridnetata tridentata*), mixed desert shrub, riparian woodland (mainly willows; *Salix* spp.), and irrigated cropland occur scattered throughout the Project Area. Cheatgrass (*Bromus tectorum*) is prevalent in many areas of the Project Area, and crested wheat grass (*Agropyron cristatum*) was recorded in several areas.

1.2 Soils Data

Soils of the Project Area have been classified by the USDA-NRCS (2009), and are included in the Soil Survey Geographic (SSURGO) database. The NRCS has identified 15 soil series in the Project Area (Table 1), with the following soil series being most common: Enko coarse loam (0 to 30 percent slopes), Hunnton fine loam (1 to 30 percent slopes), Dacker fine loam (0 to 15 percent slopes), Bioya fine loam (0 to 15 percent slopes), Chiara loam (0 to 30 percent slopes), and Sonoma fine silt (0 to 2 percent slopes). Of the soil series mapped in the Project Area, 11 of the 15 soil series have a loam soil component.

The majority of the Project Area (84%) is classified as a loam, sandy loam, or clay loam (USDA-NRCS 2009), all of which are fertile soils. Loamy soils are better suited for reclamation and will aid in regrowth of native vegetation.

Table 1. Soil series present within the Marys River Project Area in Elko County, based on USDA-NRCS SSURGO soils data (USDA-NRCS 2009).

Soil Series	Acreage	% of Project Area
Enko - coarse loam, 0 to 30 percent slopes	8,183.61	20.79
Hunnton - fine loam,1 to 30 percent slopes	6,530.01	16.59
Dacker - fine loam, 0-15 percent slopes	5,527.04	14.04
Bioya – fine loam, 0-15 percent slopes	5,126.83	13.02
Chiara - loam, 0 to 30 percent slopes	3,945.93	10.02
Sonoma - fine silt 0 to 2 percent slopes	3,754.67	9.54
Oupico - coarse loam, 0 to 30 percent slopes	3,463.31	8.80
Ocala - fine silt, 0 to 2 percent slopes	1,671.26	4.25
Halleck - fine silt, 0 to 4 percent slopes	499.50	1.27
Welch - fine loam, 0 to 15 percent slopes	287.10	0.73
Sonoma variant - silt loam, 0 to 2 percent slopes	205.14	0.52
Moranch - coarse silt, 0 to 2 percent slopes	137.53	0.35
Crooked Creek - clay loam, 0 to 4 percent slopes	14.14	0.04
Hunewill - sandy loam, 0 to 30 percent slopes	9.44	0.02
Hussa - clay loam, 0 to 9 percent slopes	6.28	0.02
Total	39,361.77	100.00

Ecological Site Soils Description

The Marys River Project Area is comprised of four ecological sites defined by the USDA-NRCS (2009) (Table 2). Over 83% of the Project Area is classified as a loamy site within the 8-10 inch precipitation zone. Soils in this area are comprised of mostly well drained, clayey or loamy, Mollisols (USDA-NRCS 2006). The presence of saline bottoms, saline meadows, and sodic flats, although a small component of the Project Area, possesses a problem to conventional reclamation. Native vegetation will be used in all areas of reclamation and in areas of high salinity, native vegetation that is salt tolerant will be used. In the event that the BLM or private surface ownership request Noble to establish a more desirable species, soil amendments may need to be made (Norton and Strom 2012).

Table 2. Ecological Soil sites present within the Marys River Project Area in Elko County, based on USDA-NRCS SSURGO soils data (USDA-NRCS 2009).

Ecological site	Ecological Site Number	Acreage	% of Project Area
Loamy 8-10 inch precipitation zone.	R025XY019NV	32,786.16	83.29
Loamy Bottom 8-14 inch precipitation zone.	R025XY003NV	2,535.69	6.44
Saline Bottom	R024XY007NV	1,876.40	4.77

Table 2. Continued.

Ecological Site	Ecological Site Number	Acreage	% of Project Area
Saline Meadow	R024XY009NV	1,233.12	3.13
Wet Meadow	R025XY005NV	792.88	2.01
Sodic Flat 8-10 inch precipitation zone.	R024XY008NV	137.53	0.35
Total		39,361.77	100.0

Geomorphologic Landforms

The most common landforms of the area are fan remnants, fan skirts, and floodplains, together comprising 95% of the Project Area (Table 3). Areas classified by the NRCS as fan remnants are remaining parts of older fan-landforms. Fan skirts are lower lying areas, formed by water runoff throughout upland areas. Floodplains are classified as nearly level ground adjacent to streams prone to inundation under flooding conditions. Although only a small percentage of land is classified as floodplains, these riparian landforms are an important part of the landscape. Floodplains occur along the Humboldt River and Bishop Creek.

Table 3. Geomorphologic landforms present within the Marys River Project Area in Elko County, based on USDA-NRCS SSURGO soils data (USDA-NRCS 2009).

Landform	Acreage	% of Project Area
Fan Remnants	24,881.19	63.21
Fan Skirts	7,896.66	20.06
Flood Plains	4,766.82	12.11
Alluvial Flats	1,110.02	2.82
Inset Fans	707.07	1.80
Total	39,361.77	100.00

1.3 Climate Data

The majority of the Marys River Project Area is nearest to the NOAA Wells, Nevada weather station (Station No. 268988). The highest precipitation months are January, March, and May. Total average annual precipitation, according to the 30 year average, is 9.85 inches (Western Regional Climate Center: http://www.wrcc.dri.edu/), which could be a limiting factor for reclamation, particularly in drier than average years.

1.4 Ecoregions

A broad description of vegetation is the Ecoregion. A single ecoregion is present within the Marys River Project Area (Bryce et al. 2003). The Omernik Level IV Ecoregion 13m, described as Upper Humboldt Plains, is a semiarid vast region of rolling plains, interspersed by occasional buttes and low mountains. The dominant vegetation in this ecoregion is low sagebrush (*Artemisia* spp.), often associated with various cool season grasses, such as bluebunch wheatgrass (*Agropyron* spp.), Idaho fescue (*Festuca idahoensis*.), and sandberg bluegrass (*Poa secunda*) (USDA-NRCS 2006). This ecoregion is cooler and receives more moisture than other ecoregions in Nevada, in the same elevational range. Grazing is the primary land use with some irrigated cropland found near flowing streams.

1.5 Grazing Units

There are 12 grazing allotments present within the Marys River Project Area, summarized in Table 4 (USDI-BLM 2006). Acreages listed in Table 4 are the total number of acres in each allotment, not the amount of acres found within the Project Area.

Table 4. Grazing allotments present within the Marys River Project Area. Unit number, name, and size are summarized.

Grazing Unit	Unit Name	Acres
3206	Bishop Creek	7,766
3228	Metropolis	41,853
3229	Metropolis Seeding	2,456
3233	Rabbit Creek	6,715
3241	Westside	7,874
3242	Mud Springs	3,998
3243	Railroad Field	3,165
3246	Antelope Springs FFR	1,489
3247	Burnt Creek	3,422
4310	Clover Creek FFR	1,488
4319	Hylton	4,166
3208	Black Butte	61,799

2.0 Surface Disturbing Activities

This section outlines requirements listed in Chapter 519A – *Reclamation of Land Subject to Mining or Exploration Projects* (NAC 519A), which operators are obligated to follow.
Requirements include:

1. Manage waste materials.
2. Ensure subsurface integrity (geology & hydro-geology).
3. Ensure biological, chemical, physical integrity of soil.

4. Re-establish slope stability and topographic diversity.
5. Re-establish stable water courses and drainage features.
6. Prepare site to meet the needs for plant establishment.
7. Re-establish desired self-perpetuating native plant community.
8. Return visual composition to blend with surroundings.
9. Prevent introduction/establishment of invasive plants.
10. Implement a monitoring and management protocol.

2.1 Proposed Activities

The primary activities proposed in the Marys River Project Area will be exploratory oil and gas drilling activities (Noble Energy 2012). Depending on well pad selection (maximum of 20 wells) the proposal could include upgrading up to 28.1 miles of existing roads and possibly constructing up to 10.3 miles of new roads.

2.2 Management of Waste Materials

All waste materials will be managed responsibly. Contaminated soil will be segregated, treated, and/or bio-remediated, following guidance from the BLM who will be notified if contamination occurs. The BLM must authorize any waste materials to be buried on site. Similarly, the disposal of waste (including trash) off site must be to an authorized disposal facility. All hazardous waste material identified by the Comprehensive Environmental Response Compensation Liability Act (CERCLA) removed from the site will be disposed of at a hazardous waste facility that is approved by the U.S. Environmental Protection Agency (Noble Energy 2012).

2.3 Ground and Surface Water Integrity

The operator will ensure the integrity of sub-surface resources by plugging drill holes and surface openings, and filling/capping any other openings to ensure that contamination of ground and surface water does not occur. Noble Energy will prepare a Spill Prevention Plan and a Storm Water Management Plan with the approval of the state regulator agency and BLM (Noble Energy 2012).

2.4 Soil Management

In general, topsoil will be collected from the uppermost horizon and stored separately from the subsoil. Topsoil depth may vary across the well pad site, and will be stripped and salvaged accordingly. In the event that no topsoil is present on the site, any growth medium to be used will be stockpiled and treated in the same manner as topsoil (NAC 519A.325). Contractors will reference the site-specific document to determine salvage strategies. Precautions will be taken to protect soil from erosion, degradation and contamination, including covering piles with mulch, and diverting water runoff around piles. If mulching is necessary, a certified weed free straw or hay mulch will be applied (Noble Energy 2012). Topsoil piles will be labeled to avoid confusion.

Soil that will be stored for more than one growing season will be seeded with short-lived species to compete against weeds in accordance to NAC 519A.325. Early successional natives such as bee plant or slender wheatgrass are recommended (Norton et al. 2009). Soil will not be piled too high, as the resulting compaction and anaerobic conditions can result in soil degradation.

2.5 Slope Stability, Surface Stability and Topographic Diversity

Reclaimed topographic conditions will be similar to pre-disturbance conditions (Noble Energy 2012). The reclaimed landscape will blend with the surrounding contours, and erosion prevention and maintenance of current hydrology will be necessary. Cut slopes will be reclaimed to natural contours, unless otherwise approved by the BLM.

2.6 Sheet and Rill Erosion

All water quality and water management issues will be addressed by a Storm Water Management Plan (Noble Energy 2012). Depending on site specific needs, culverts, wing ditches, and channels will be utilized to manage water. Waterbars, slope breakers, erosion control blankets, fencing, mulch, straw bales, and rolls may also be used to manage soil erosion. Soil erosion control will be implemented on sites in highly erosive soils and steep areas. Mulching, netting, tackifiers, hydromulch, matting, and excelsior are common methods used to limit erosion on slopes. The type of control measure will depend on slope gradients and the susceptibility of soil to wind and water erosion. All runoff and erosion control structures will be inspected periodically, cleaned out, and maintained in functional condition throughout the duration of construction and drilling.

2.7 Drainages and Riparian Areas

All drainages affected by the well pad or access road will be maintained by culverts and other methods (USDI-BLM 2012). All roads will be constructed in a manner that does not result in grading within and parallel to drainages. To avoid depositing fill material in drainages, roads will be constructed at a height above drainage channels (USDI-BLM 2012). During the reclamation phase, drainages will be reconstructed and stabilized to function similar to pre-disturbance levels. Drainages and riparian areas will be addressed in greater detail in the site-specific reclamation plans.

Riparian areas will be avoided whenever possible; if impacted, there will be no net loss of riparian habitat in the long-term. According to BLM recommendations, operational activities will be restricted within 400 feet of springs or seeps (USDI-BLM 2012).

3.0 Site Preparation and Seeding

This section outlines standards that will be adhered to during the reclamation period. All operators and contractors will be aware of and comply with the following standards:

- Soil will be redistributed with the subsoil spread first, and the topsoil on top. The topsoil will be spread to a depth of 6 inches across the disturbed areas (Noble Energy 2012).

- Compaction will be mitigated in areas with significant traffic or weight placed on them (i.e. parking areas) to approximately 12 inches, using standard ripping methods (Noble Energy 2012). Ripping will take place prior to application of topsoil.
- A plant community will be established by using a seed mix recommended by the BLM or landowner (Noble Energy 2012).
- Seed will be selected that is locally adapted and genetically appropriate (i.e. choose a local seed supplier, and ensure genetic compatibility with local plants. Seed from lower elevations/warmer climates may not be adapted for Nevada growing conditions).

3.1 Seeding Methods

The methods required to successfully seed reclamation areas differ substantially from standard methods used for agriculture. Terrain is rougher, soils are often shallow, and seeding methods vary from species to species. Methods must be adaptable to account for individual species requirements within the seed mix. Segregation of seed by size and planting depth is critical for optimal regrowth, as different plant species have different seed sizes and require different planting depths. Most conventional grain drills lack individually suspended seed boxes, making them inadequate for reclamation seeding. Additionally, standard depth regulators have a tendency to plant native species too deeply, leading to poor success. It is highly advisable for contractors to use specialized rangeland equipment, such as rangeland drills, Truax drills, land imprinters, Amazon no-till drills, broadcast seeders, Brillion-seeders, seeder-scalpers, inter-seeders, surface seeders, hydro-seeders, scarifiers, dozers, or other appropriate equipment.

Contractor experience with native species is a crucial component of successful seeding. Knowing when, where, and under what conditions to plant the seeds will be important. Many forbs, shrubs, and some grasses do not compete well as young plants and will be planted with compatible species. Less aggressive, slower growing species will be planted separately from faster growing more aggressive species. For example, slender wheatgrass (*Elymus trachycaulus*) is commonly used in seed mixes, but can affect the establishment of slower growing perennials if reseeded too heavily (USDA-NRCS 2001). Some species require companion species. In areas with known weed infestations, more aggressive species may be necessary to out-compete weeds. There are many variables to consider, so care must be taken in seed selection and planting technique.

3.2 Seed Mix Development

An important goal of a site-specific reclamation plan is to develop a seed mix which is representative of the pre-disturbance native vegetation (USDI-BLM 2008). Seed must be weed free, and germination rates and success documented in an annual monitoring report (see Section 5.0). Seed tag copies must be included in the report. Two common seed tags are blue tag and yellow tag:

- Certified seed (Blue tag) - Applies to cultivated, not wild collected seed. Seed must be inspected and pass laboratory tests to regulate how the seed is produced, harvested, and cleaned. Seed is weed free and genetically approved.

- Source identified seed (Yellow tag) - Applies to native seed collected from the wild. The location of seed harvest must be verified by the Association of Official Seed Certifying Agencies (AOSCA).

In addition to the seed tag requirements, documentation of the Pure Live Seed (PLS) used in the seed mix is required. PLS is a measure describing the percentage of a quantity of seed that will germinate as a percentage of a given weight of seed (USDA-NRCS 2001). PLS is a way to standardize quality allowing the purchaser to compare the quality and value of different lots of seed. PLS is calculated by multiplying the percent purity of the seed mix and the percent germination together and dividing by 100 (PLS = % purity x % germination/100).

3.3 Seedbed Preparation

Successful preparation of seedbeds will require significant experience from the contractor. In general, seeding will take place immediately preceding the season with the highest chance of precipitation. Seedbed preparation can take place early in the fall, after September 1, so that planting can occur in late fall or early winter. Fall planting in the Marys River Project Area is highly recommended as the winter snows and resulting melt provide adequate growing conditions for seeds. Spring plantings, prior to May 15, often result in successful germination, but in summers of low precipitation and high temperatures plant survival can be limited. However, when proper conditions exist (i.e. particularly moist years), planting can occur through the winter into early spring. For smaller areas such as a well pad site it is feasible to broadcast sagebrush seed on the snow. Ideally this could occur prior to an arriving storm system to allow the fresh snow to cover the seeds, preventing wind disturbance. This type of seeding should be conducted in spring (e.g., March/April) to avoid premature germination of seeds if unseasonably warm conditions should occur.

While early preparation of the seedbed is an option, seedbed preparation and seeding often occur simultaneously. Therefore, it is critical to choose the proper methods and timing. A good strategy is to leave seedbeds in a rough surface condition, then broadcast seed, followed by light chaining or harrowing to increase soil to seed contact. Deep furrow drilling will not be used in dry soils or in loose soils because it tends to slough and leave seeds at uneven depths and often too deep for germination. Deep furrow drilling in tighter soils may be appropriate because it can reduce soil moisture loss and shade new seedlings. Cultipacker seeders, punch drills, pitting, and some compact drills may also be a good strategy for loose soil types, particularly if they are able to segregate seed and plant at varying depths. It is essential that seeds have good contact with the soil for germination.

4.0 Invasive Species

Operators will be held accountable for the spread of noxious weeds caused by disturbances associated with development on federal lands (USDI-BLM 2012). Noxious weeds will be documented during the pre-disturbance survey, and site-specific management will be addressed. Noble Energy will be developing an integrated weed management plan. This plan outlines management goals, methods, and monitoring of weeds of site specific applications. Weed surveys will be completed annually for the life of the project following these protocols. Herbicide use must be approved by the BLM.

5.0 Monitoring Plan

A monitoring report will be completed annually, if required by BLM. Data will be collected based on the Elko District office required protocols.

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